BLUE DOLPHIN LABRADOR EXPEDITION

1952

FIELD REPORT

10 OCTOBER 1952

BLUE DOLPHIN LABRADOR EXPEDITION 1952

FIELD REPORT

by

Commander David C. Nutt, USNR

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PRELIMINARY

This report covers the field operations of the Blue Dolphin's 1952 summer expedition to the Labrador coastal waters, and gives the general organization of the expedition, the narrative, and brief summaries of the investigations undertaken. Reference is made to the 1949, 1950, and 1951 field reports for a description of the research vessel, Blue Dolphin, and the nature of the work conducted in the Labrador area on previous expeditions.

1. The 1952 Plan of Operation:

The 1952 program continued the previous years' work. The primary area of study was again the Hamilton Inlet-Lake Melville estuary where a continuing series of observations, including summer and winter regime studies, are producing a detailed understanding of this estuary, in its relation both to general estuary mechanics and to the Labrador coastal waters. Early and late summer regime observations were planned for the area, and the first two weeks of July and the last two weeks of August were allocated for this purpose.

During the intervening peroid investigations were to be shifted to northern Labrador where the Nain Bay and Hebron Fjord stations, established in 1951 and 1949 respectively, were to be reoccupied. As an additional project in this area it was planned to carry out more detailed reconnaisance survey operations between Port Manvers and Saglek.

As before, marine and fresh water biological collections, with the emphasis on fishes, were made at all points along the coast.

2. Personnel:

The expedition personnel totaled nineteen. In addition, Harvey Montague served as guide to river survey and biological parties operating in the North West River area and made available his thirty foot motor boat.

Name	Home or Institution	Position
David C. Nutt	Dartmouth College	Master, Commander, and oceanographer
Reginald Wilcox	Hartford, Conn.	Mate
Lawrence K. Coachman	Dartmouth College	2nd Mate and hydrographer
Gerald N. Moore, Jr.	Boothbay Harbor, Me.	Engineer
Benjamin F. Potter	Dartmouth College	Ship's cook
Roderic Park	Harvard University	Ass't oceanographer
Edgar R. Miller, Jr.	Dartmouth Medical School	Oceanographic chemist
John T. Tangerman	Dartmouth College	Ass't oceanographer
Stearns A. Morse	Dartmouth College	Ass't hydrographer
Lee W. Henderson	Harvard University	Ass't oceanographic chemist
William Z. Lidicker, Jr.	Cornell University	Zoologist
L. Coleman Dorsey	Dartmouth College	Student Ass't
Alan Campbell	Deerfield Academy	Student Ass't

Bailey Smith	Cornell University	Student Ass't
Donald Charbonnier	Dartmouth College	Student Ass't
Hubert S. Bush	Dartmouth College	Student Ass't
Paul Potter	Princeton University	Student Ass't
Bruce Wald	Bowdoin College	Communications and Electronic Engineer
Mary Louise Nutt	Hanover, N. H.	Ass't Communications

3. Acknowledgments

The expedition was carried out under the auspices of the Arctic Institute of North America with funds and assistance provided by the U. S. Hydrographic Office and the Office of Naval Research. The following institutions provided additional support, furnishing personnel, research grants to expedition members, supplies, items of equipment and miscellaneous services: the Woods Hole Oceanographic Institution, the Smithsonian Institution, the U. S. Coast and Geodetic Survey, the Chesapeake Bay Institute, Dartmouth College, Dartmouth Medical School, and Cornell University.

The research program in oceanography and biology was planned and carried out with the assistance and guidance of Mr. Richard H. Backus of Cornell University who served as expedition oceanographer and biologist from 1949 to 1951 and who this summer was completing his research studies on the ichthyofauna of Labrador.

Special assistance was afforted the expedition while in the operating area by the U. S. Air Force which provided an ice reconnaissance flight to northern Labrador and an air drop of a vitally needed engine part.

The kind reception and hospitality received from the Grenfell Mission, the Moravian Mission, the local government officials, and the people along the coast contributed much to the ease and enjoyment of working in this area.

Deepest appreciation is hereby expressed to the above-mentioned and to other groups and individuals who in many ways helped to make the 1952 project successful.

II NARRATIVE

1. Boothbay Harbor, Maine to Hamilton Inlet, June 22nd to June 28th:

In addition to many minor items of upkeep and repair during the winter months, main engine and generator maintenance work was undertaken, and the forward galley water tanks repaired.

On May 14th, Reginald Wilcox reported on board and actual fitting of the vessel for sea was initiated. The vessel was hauled at Frank L. Sample Jr.'s marine railway on June 5th for hull inspection and painting. The progressive maintenance program of caulking was continued. A new stem piece was scarfed in and covered with iron sheathing to repair damage suffered last fall when the vessel struck a buoy entering New London harbor.

During June, the remainder of the ships company assembled. Supplies, rigging, and equipment were loaded; and final preparations were completed for departure on June 22nd. A fine passage north was made with moderate winds and smooth sea except for a few hours of fresh southwest wind on June 24th off Cape Canso, Nova Scotia. On the evening of June 27th anchorage was taken in Assizes Run near Battle Harbor and on the following day Pigeon Cove south of Hamilton Inlet was reached, just six days from

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Donald Chagbonder
Robert J. Bush
Paul Potter
Bruce Wold

Mary Louise Hall

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Boothbay Harbor. In 1951, because of particularly dirty weather and a call at St. Anthony, Newfoundland, fourteen days were required to reach this same locality.

2. Hamilton Inlet-Lake Melville Estuary, June 29 to July 12:

June 29th: Oceanographic operations were commenced with an outer Hamilton Inlet section from Cape Porcupine to the White Bear Islands and five oceanographic stations and eleven STD stations were established. Off Tumble Down Dick Island, pack ice was encountered which was loose enough however to permit navigation and station occupation. On completion of the section, the Blue Dolphin worked to the westward out of the pack ice which extended in to the vicinity of George Island. Anchorage for the night was taken in "Rattler's Bight" where two beam trawls were made.

June 30th: Worked into Hamilton Inlet, establishing a George Island section and a Bluff Head section. Anchorage for the night was taken at Black Island where again two beam trawls were made.

July 1st: A Black Island section was completed during the morning, but in the afternoon a strong southwest wind came up causing rapid drifting which made oceanographic operation impractical. Shelter was sought under the land in Turner's Bight. The lay up afforded a much needed opportunity to water ship. During the evening the wind dropped, and the Pompey Island section established last year was reoccupied.

July 2nd: The Ticoralak and Bromfield sections were occupied during the early morning at slack water. Anchorage was taken in Collingham's Cove at 1000 to await the change of tide before proceeding through the Narrows. Previous experience in this area has shown that it is impractical to run against the four to seven knot tidal current with the seven knot Blue Dolphin. Under-way again at 1400 with a fair tide. A tide staff party was dropped at Pike Run Cove while the vessel proceeded into Lake Melville to occupy an oceanographic station off Henrietta Island. At 1900 a sharp cold front went past and shelter from a heavy squall was sought in Pike Run Cove.

July 3rd and 4th: These days were spent carrying out an examination of the Backway, an uncharted arm of Lake Melville extending some twenty miles eastward of Pike Run. Controlled sounding lines were first run in and out to determine the general bathymetry after which three oceanographic station sites were selected and occupied. After completing the work on July 4th, a station was made off Eskimo Island in the very deepest part of Lake Melville where a two hundred and fifty meter bottle was hung. While proceeding to St. John Island Harbor, the Gull Island Section was reoccupied, a beam trawl made on the bank of Neveisik Island, and a new Reed Point section established.

July 5th and 6th: During these two days the complete Lake Melville grid of stations was occupied. A more comprehensive grid was established in Goose Bay, and the Terrington Basin station was occupied. The Blue Dolphin then docked at 1725 July 6th alongside the wharf at Goose Bay.

July 7th and 8th were spent at Goose Bay. Stores and fuel for the northern trip were taken aboard. An ice reconnaissance flight through the courtesy of the Air Rescue Service, USAF, was made to determine ice conditions northward along the coast. The only pack ice observed was in the vicinity of Cape Harrison and was easily navigable. Aboard the vessel, salinity titrations of the Lake Melville samples were made, and the NK-7 portable fathometer was installed and tested in the launch.

Botwood Harbour. In 1951 we [illegible]
Anthony, Newfoundland. Fourteen [illegible]

2. Hamilton Inlet-Lake Melville Section

June 29th: The [illegible]
Inlet section from Cape [illegible]
stations and station 37 [illegible]
pack ice was encountered [illegible]
station occupations [illegible]
westward out of the pack [illegible]
Anchorage for the night [illegible]
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and a Bluff Head section [illegible]
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River volume measurements were taken in the Goose River, and the spring freshet channel into Terrington Basin examined and measured. On the 8th, Coachman, Park, Lidicker, and Tangerman left with Harvey Montague to make river volume measurements of the Kenamu, Hamilton and North West Rivers.

July 9th: In getting underway from Terrington Basin, the anchor fouled an old mooring chain on the bottom and considerable delay was encountered before it was cleared and recovered. The vessel proceeded to North West River where rendezvous was made with the river volume survey party.

July 10th was spent at North West River while a party consisting of Wilcox, Tangerman, Miller, and Campbell with Harvey Montague and his boat went to make an oceanographic examination of Grand Lake. It is of interest to note that at three stations the depth was greater than two hundred meters, the length of wire available on the reel.

July 11th: The Grand Lake party returned at 0300, and at 1050 final departure was taken from North West River for northern Labrador. Anchorage for the night was taken in Collingham's Cove just outside the Narrows.

3. Northern Labrador, Nain to Saglek, July 12th to August 18th:

The passage north was uneventful and made as rapidly as possible with no stops except to lie up for the few hours of darkness at night. Fog caused a little delay at Cape Harrison and at the Ironbound Islands, but on July 15th the Port Manvers area was reached and reconnaissance survey operations commenced.

July 16th and 17th: In magnificent weather, these days were spent running offshore sounding tracks between Port Manvers and Saglek. Anchored during the nights at Hebron.

July 18th: After four days of unbroken good weather, the first northeaster of the season with rain all day and a moderate gale during the evening forced the vessel to remain at anchor.

July 19th: The gale moderated. In view of the huge sea running offshore and in the fjord entrance, both sounding and oceanographic operations were carried out within Hebron Fjord where good working conditions were found. Difficulty was encountered with the main engine and during the evening number one cylinder head was replaced.

July 20th: Commenced offshore sounding operations, but continued main engine difficulties forced a return to the harbor. The launch carried out inshore soundings off the entrance to Iterungnek. A piece of electric light blub was located in the lube oil scavenging pump which had been blocking the pump and causing the lube oil pressure failure. It was also discovered that a spring was missing from number one fuel pump. This caused improper operation of number one cylinder all summer.

July 21st: In the morning, main engine repairs and adjustments were completed. Then soundings were made in the approaches to Hebron during the afternoon and evening.

July 22nd and 23rd: Sounding operations were carried out between Hebron and Saglek, and three oceanographic stations off the entrance to Hebron Fjord were occupied in fine weather.

July 24th and 25th: The weather deteriorated with rain and poor visibility which forced discontinuance of work at 1000 on the 24th. Remained at anchor during a moderate westerly gale on July 25th.

July 26th: Soundings were made off Hebron and several bays and inlets to the south of Hebron were examined. A southerly wind and threatening weather persisted all day.

July 27th: The day began clear with a strong westerly wind which moderated at noon. After lunch the Blue Dolphin got underway making soundings toward Cape Mugford, and anchored for the night in Forbes' "Geology Cove" just inside Mugford Tickle.

July 28th: Sounding operations were carried out off Cape Mugford and the Nanuktuk during the morning, and in the inner waters during the afternoon due to strong southeast wind and fog offshore. In reference to charts, a record was made today when the 1000 foot contour was crossed in investigating an uncharted bay! Anchorage for the night was taken in Moore's Harbor.

July 29th: Fog all day. Anchorage was shifted into Nutak during the afternoon.

July 30th: Continued sounding operations outside Cape Mugford en route to Hebron.

July 31st: This day was spent in Hebron Fjord reoccupying the oceanographic stations established in 1949 and making plankton collections and trawls.

August 1st: A fresh northerly wind delayed operations until afternoon. Soundings were made in the approaches to Napartok Bay, and the anchor was dropped for the night at "Pukke".

August 2nd and 3rd: These days were spent examining the runs, inlets, and bays from Napartok to Nutak. Anchored at Amity Harbor and Nutak.

August 4th: Sounded between Nutak and Port Manvers, southbound on an outside track and northbound on an inside run.

August 5th: Due to a heavy swell and continuing northeast wind offshore which did not permit accurate work, the sheltered waters of Okak Bay were examined.

August 6th and 7th: Anchored at Nutak in perfectly foul weather, thick fog, rain, and northeast wind. However, the time was spent profitably making several trawls and biological collections, watering ship, and making record transcriptions, thermometer corrections, and density computations.

August 8th and 9th: The easterly weather continued but conditions were improved so that a partial day's work was carried out in Okak Bay and in the vicinity of Nutak and Cutthroat.

August 9th to 11th: Easterly weather persisted, but sounding operations were carried out while working south from Nutak to Nain.

August 12th: The Nain Bay oceanographic stations established in 1951 were reoccupied.

August 13th: A beautiful clear day, and a ship's holiday was declared. A boat party went to investigate a Salt Water Pond in Anaktalik Bay where it was reported codfish are caught during the winter time. (No codfish were caught at this season,

and the bottom water of the pond was found to be stagnant with the production of hydrogen sulphide). Another party went ashore berry picking, several went hiking, and others visited at the Moravian Mission. During the evening, Reverend and Mrs. Peacock invited all hands to the mission where Blue Dolphin and Nain pictures were shown followed by a songfest.

August 14th: The rest of the Nain area stations were reoccupied and shortly after noon the Blue Dolphin started south reaching Launce Ground near Cape Harrigan at dusk.

August 15th to 18th: These days were spent proceeding from Cape Harrigan to Goose Bay with overnight stops at West Turnavik, Indian Harbor, and Collingham's Cove.

It had been planned to occupy the Hamilton Inlet stations on the way in, but a dirty northeaster set in on the 17th and continued through the 18th. Inasmuch as we were in need of fuel, stores, and an availability for engine maintenance, advantage was taken of the fair wind to run into Goose Bay.

4. The Hamilton Inlet-Lake Melville Estuary, August 19th to August 28th

August 19th: The day was spent at Goose Bay taking fuel and stores, and carrying out ships force maintenance work on the main engine. Coachman and a party made river volume measurements of the Goose River. Harvey Montague rejoined the expedition with his motorboat and canoe.

August 20th: Coachman, Tangerman, Dorsey, and Charbonnier departed with Harvey Montague to make river volume measurements in the Hamilton and Kenamu Rivers. The vessel proceeded to North West River, occupying en route the Terrington Basin station and the Goose Bay grid. Rendezvous was made during the evening with the river survey party.

August 21st: Tangerman, Morse, Henderson and Smith departed with Harvey Montague in his motorboat for a Grand Lake survey. On this trip by adding the lead line to the two hundred meter BT wire, bottom was reached at all stations, the greatest depth obtained being one hundred and thirty eight fathoms. With the vessel, the Epinette Point and Square Top sections were occupied in the western half of Lake Melville.

August 22nd: During the forenoon, the Captain, Coachman, Tangerman and M. L. Nutt with Harvey Montague made river volume measurements of the North West River. A moderate southerly gale arose at noon and forced suspension of operations for the rest of the day.

August 23rd: At 0400 final departure was taken from North West River. A fresh easterly wind came up during the forenoon, becoming strong by late afternoon; but fortunately a strong ebb current against the wind rendered station occupation possible and the Lowland and Charley Point sections in eastern Lake Melville were occupied. Anchorage for the night was taken in the cove at the head of Etagaulet Bay where an almost complete calm prevailed while Lake Melville remained a mass of white caps.

August 24th: During the early forenoon, the easterly wind abated and it soon set in westerly with rain showers and overcast. The Reed Point, and Gull Island sections were reoccupied. An otter trawl was made on the eighteen fathom bank to the eastward of Neveisik Island.

August 25th: In spite of a fresh to strong westerly wind which continued all day, the Backway stations were reoccupied and a very successful otter trawl made in the Backway. This completed the Lake Melville work. Anchorage for the night was taken in Collingham's Cove as the wind moderated.

August 26th: Rain showers and several wind squalls occurred with a frontal passage, but on the whole good working conditions prevailed and reoccupation of the four inner Hamilton Inlet sections was completed.

August 27th: The day began clear and calm and the Bluff Head and George Island sections were completed by late afternoon, just as another warm front with rain and dirty weather set in. Anchorage was taken in Ice Tickle.

August 28th: A cold front went through followed by a fresh to strong northwest wind. Occupation of the outer section from the White Bear Islands to Cape Porcupine was completed after a rather dubious start when on the first station the wind freshened momentarily and waves started to come aboard. By mid-afternoon the wind dropped and ideal working conditions prevailed. Immediately on completion of this section and after anchoring in Pack's Harbor, another storm set in with heavy rain squalls and easterly winds of thirty to thirty-five knots. This completed the program of work in the Hamilton Inlet-Lake Melville estuary during 1952.

5. Hamilton Inlet to Boothbay Harbor, Maine, August 29th to September 6th

August 29th: The wind moderated somewhat backing to northerly, and departure from the operating area was taken. Eagle Cove in Hawke Island was reached for the night where the ship's fresh water tanks were filled for the passage home.

August 30th to September 6th: These days were spent underway from Eagle Cove to Boothbay Harbor, Maine. A brief stop was made at Port Saunders, Newfoundland, to make certain hydrobiological collections, and at Sydney, Nova Scotia to pick up Dr. William Mauran who joined the ship for the last few days.

The passage was uneventful. Head winds with thick fog off the coast of Nova Scotia made that part somewhat unpleasant; but it was a reasonably good, though not fast, run. East Boothbay, Maine was reached early in the morning of September 6th. Here U. S. Customs and Immigration boarded to clear the vessel and ship's company. The *Blue Dolphin* then docked just before noon in Boothbay Harbor, which completed the 1952 field operation.

During the following week the vessel was decommissioned and put into winter quarters. Records, specimens, and equipment were shipped to the various participating institutions and agencies; and the ship's company signed off and departed for their homes.

III GENERAL COMMENTS

1. Weather:

In an operation of this nature in the Labrador area the weather can be the controlling factor that leads to success or failure. Bad storms or continued periods of fog can bring certain phases of the work to a complete halt and prevent completion of the task.

In July and August 1952 the weather can only be termed good. There were no major storms or severe holdups. Moderate seas and good visibility provided favorable working conditions throughout most of the summer. Out of the sixty-three days along the Labrador coast, only five days were sufficiently bad to require the vessel to remain at anchor; and even on some of these, certain limited projects such as harbor sounding and biological collecting were carried out. Of course a number of other days were partially lost due to the weather, but these interruptions were few and not serious.

The weather information available was again very good for planning purposes and contributed substantially toward the efficiency of operation. The NSS Western North Atlantic forecast together with special local forecasts prepared by the Meteorological Office at Goose Bay provided good coverage of the Labrador coast where reliable and regular forecasts are not otherwise available. While en route to and from the area the Halifax and Gander regional forecasts together with NSS provided excellent information.

2. Plan of Operation

The plan of operation as contemplated was carried out. The expedition was in the field a total of seventy-six days from June 22nd to September 6th with the time being divided as follows:

Underway to and from Labrador waters	13 days
Coastwise navigation in Labrador waters	9 days
Hamilton Inlet-Lake Melville study	23 days
North Labrador operation	31 days
	76 days

With the many unforeseen difficulties and uncertainties connected with such an expedition, it is quite remarkable that the 1952 operation was carried out almost exactly on schedule or actually a little ahead of schedule. The program of work undertaken was an ambitious one for which, with the normal allowance for delays, a considerable longer field season might have been expected. Its completion in exactly two months can be attributed largely to the good weather that prevailed throughout the summer. The projected oceanographic studies of Hamilton Inlet and especially the sounding operations offshore and among the outer islands were completed under the best of conditions.

In comparison with 1951, a substantial amount of time was saved by omitting a stop at St. Anthony and proceeding direct to Goose Bay and the study area. A larger number of experienced personnel brought greater efficiency to the work, which contributed materially toward the rapid completion of the task. Every advantage was

taken of the favorable conditions and operations were pushed to the utmost during the long summer hours of daylight. The vessel was underway at dawn and very often anchored after dark. The several questionable days were devoted to the inshore phases of the work or to traveling coastwise, and the few impossible days, it must be admitted, provided a welcome break and were used to keep up with the great volume of associated paper work.

3. Conclusion:

The summer of 1952 was profitably spent in Labrador waters. The continuing and repeated oceanographic observations are giving us a better understanding of the conditions and processes within the study areas. The series of data from the Hamilton Inlet-Lake Melville area over the past three years is particularly valuable, especially with the determination of the basic winter regime made during March 1952. The principal requirement now in rounding out the oceanographic study of this area is observations at other seasons in order to trace more accurately the seasonal transition throughout the annual cycle.

The reconnaissance survey operations carried out in the Port Manvers to Saglek area will provide valuable data of the general depths and bottom topography. Until such time as a complete hydrographic survey with triangulation and proper shore control is possible, a vessel such as the *Blue Dolphin* can effectively and economically carry out preliminary examination of such uncharted areas.

ANNEX A.

HYDROGRAPHIC FIELD REPORT

by

Commander David C. Nutt, USNR

A principal part of the 1952 project was the carrying out of reconnaissance survey operations in the area from Port Manvers to Saglek Bay, an area where little actual sounding work had previously been done. Approximately 1500 miles of controlled sounding lines were run in this area with the purpose of making a preliminary development of the general bottom topography of the area with a more detailed examination of the approaches and runs more generally used and suitable for navigation.

While in this area and while travelling along the coast examination was made of the Sailing Directions and corrections and additions prepared as practicable.

Soundings were made from the Blue Dolphin with an NJ-9 recording fathometer; and control was established by bearings of peaks and tangents and by sextant angles. In addition soundings close inshore in certain areas were made from the Blue Dolphin launch which was equipped with an NK-7 portable recording fathometer.

These reconnaissance survey data will be prepared and submitted to the U. S. Navy Hydrographic Office for analysis and further dissemination.

ANNEX B.

OCEANOGRAPHIC FIELD REPORT

by

Messrs. Lawrence K. Coachman, Roderic Park,
Edgar R. Miller, Jr. and John T. Tangerman

The following report is a brief summary of the oceanographic activities of the schooner Blue Dolphin during the summer of 1952. Reference is made to the field reports of the Blue Dolphin Labrador Expeditions of 1950 and 1951 which contain general descriptions of the equipment and procedures used by the Blue Dolphin in pursuing oceanographic work.

One addition to the Blue Dolphin in 1952 was a Salinity-Temperature-Depth recorder (STD). This instrument was used in the Hamilton Inlet area to provide data supplementary to that obtained from normal oceanographic stations. There were two general methods of employment of the instrument. First, between stations (oceanographic or STD) the measuring element was towed just below the surface, being rigidly mounted on a pipe designed to hold it clear of the vessel's side. Second, when the vessel was hove to for a station the measuring element was lowered by the hydrographic winch to standard depths down to fifty meters.

The STD was limited to three salinity scale ranges: 28-40°/oo, 20-32°/oo, and 12-24°/oo. This limitation prevented effective use in Lake Melville where the surface waters were too fresh and the instrument with only 200 feet of cable could not be lowered deep enough to measure the bottom water.

In studying Lake Melville it had been found desirable to place the Nansen bottles and reversing thermometers at 5,10, 20, 30, and 50 meters, and then one to three more to obtain the bottom water. At five meters the relatively fresh surface water was measured. Ten and twenty meter observations usually bracketed the sharp thermocline to water of lower temperature, and fifty meters was the upper limit of definition of the source waters. For uniformity these depths were used at almost all oceanographic and STD stations throughout the Labrador area.

As in 1951 salinity, dissolved oxygen and inorganic phosphate determinations were done aboard the vessel. The standard Knudsen method was used, though the laboratory was not equipped with mechanical stirrers, self-filling pipettes, Knudsen burettes, and other devices found in shore laboratories. All salinities were run under approximately uniform conditions, however, including the speed of titration, the method of mixing, and the air temperature. The last mentioned proved to be fairly stable aboard a wooden vessel engaged in northern work (16-20°C.). A W.H.O.I. sub-standard sea water (Cl 19.39°/oo) was used to standardize the silver nitrate. Fifty selected samples were retained for titration upon returning by W.H.O.I. as checks to determine the margin of error.

The method employed for the inorganic phosphate was a colorimetric determination, stannous chlorate and ammonium molybdate being the reagents. To compare color intensities a photometer was constructed from a photographic light meter. The method was unsatisfactory, however, because the values were quite low and the means of comparing color intensity insufficient.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] laboratory [illegible] however, in making the [illegible]

[illegible]

The standard Winkler method was used for the oxygen determinations and proved to be quite satisfactory.

In 1952 bottom samples by snapper-type sampler and Phleger corer were taken at stations where collections had not been previously made. In addition, samples were collected from the anchor at many harbors visited by the Blue Dolphin.

Oceanographic work of the 1952 cruise began on June 23rd, the day following the departure of the Blue Dolphin from Boothbay Harbor, Maine, with a routine program of hourly bathythermograph observations off Cape Sable, Nova Scotia. The taking of these observations acquainted new crew members with operation of the winch and procedural techniques of log keeping before the principle operational area was reached. A 210', 450', or 900' BT was used as predicated by existing depths. Forty BT observations were made in the coastal waters of Nova Scotia while northbound, and fifty observations made on the homeward passage.

On June 25th a fifteen posit section was made from Scatari Island to Cape Ray across Cabot Straits, repeating sections made by the Blue Dolphin in 1949, 1950, and 1951. On September 1st and 2nd a twelve posit section was made from Cape Ray to Sydney, Nova Scotia. BT observations along the west coast of Newfoundland totalled twenty-nine posits while northbound and thirty-seven posits while southbound.

Within the Labrador area the 1952 oceanographic work may be divided into two main sections. A continuation of the intensive study of the Hamilton Inlet-Lake Melville estuary was made during early and late summer. Coastal and fjord work done in conjuction with survey operations occupied the mid-summer period.

A. Hamilton Inlet-Lake Melville Estuary

Hamilton Inlet indents the coast of Labrador at latitude 54° north. The bottom is very irregular, varying from shoals of three to ten fathoms to general depths of twenty to forty fathoms. Fifty miles westward from the outer islands the Inlet narrows until at Rigolet it is only one mile wide with a sill depth of fourteen to fifteen fathoms. Beyond this point, called the Narrows, lies Lake Melville, a tidal lake which stretches eighty miles to the westward with depths of over one hundred fathoms and which, towards its western end, becomes twenty miles wide. Goose Bay is a fifteen mile extension westward from Lake Melville. Its entrance is restricted by sand flats across which there is a channel one-half mile wide and twenty-one feet deep. Terrington Basin is a "dead-end" arm of Goose Bay ten to twelve fathoms deep, connected to the Bay by a channel fifty yards wide and six fathoms deep.

The Backway is an arm of Lake Melville extending twenty miles eastward from the junction of the Narrows and the Lake. A brief survey indicated the following topographic features: eastward of the Narrows, irregular bottom, then a sill of twenty to twenty-five fathoms, a basin of fifty to sixty fathoms, a sill of twenty fathoms, and a hole at the eastern end of nearly one hundred fathoms.

The major eastward drainage of the Ungava Peninsula flows into the western end of Lake Melville by the Hamilton, North West, Kenamu and Goose Rivers, of which the Hamilton is by far the greatest in volume and drains the largest area.

The Blue Dolphin oceanographic program in the estuary is primarily a physical study of water relationships and exchange between the estuarine basins and the ocean. There are two main water sources, fresh water from Ungava Peninsula comprising largely the surface layers and cold saline bottom water from the Labrador Current. This bottom water within Lake Melville is fresher than Labrador Current water, being about 28°/oo, but even in mid-summer it retains the temperature characteristics of Labrador Current

water, less than 0°C. (reference: Blue Dolphin Labrador Expedition, Oceanographic Report No. 1, D.C.Nutt and R.H.Backus, 1950). A brief study of Lake Melville in March 1952 by the Blue Dolphin winter party indicated marked contrast and transitions between summer and winter regimes. It is desirable to investigate further this interesting feature of the estuary.

The early summer work in the estuary began on June 29th with the establishment of the Outer section in Hamilton Inlet consisting of five oceanographic stations and eleven STD stations from Cape Porcupine to the White Bear Islands. During the following three days six more sections were established or reoccupied to give a total of seventeen oceanographic stations and forty-two STD stations.

On July 2nd work was begun in Lake Melville with the establishment of a 200 meter station off the entrance to Pike Run. July 3rd was spent in the examination of the Backway and establishment of oceanographic stations in the two basins found therein, and the third Backway station was established on July 4th.

To obtain a more complete understanding of the mixing and warming that takes place between the Narrows and the main body of the Lake the number of observations in this area was increased. Accordingly, on July 4th a station was established off Eskimo Island and a section of two stations was established off Reed Point in addition to reoccupation of the Gull Island section. On July 5th and 6th the major grid of twelve stations in the Lake was reoccupied and the Goose Bay grid was expanded to six stations.

On July 8th and 9th river volume measurements were made in the four principal affluents to the estuary. The method used was as follows. At a suitable site along the river bank a base line was measured with a surveyor's chain. From one end of the base line a cross section line perpendicular to the course of the river was established and marked on each bank. A canoe, dory, or motorboat was then anchored at various current stations on this cross section line and its position determined by transit angle from the opposite end of the base line. Six to twelve current stations were established about 100 to 200 feet apart depending on the width of the river. At each station a hand lead sounding and surface current measurement by means of a Price current meter were taken. For river flow computation a cross section of the river will be plotted and divided into flow segments about each current station. The surface current measurement will be corrected by the rapid stream factor of 0.9 (Hoyt and Grover, 1912) for applying to the segment, and the total river flow then computed by summing the flow of each segment.

Points chosen for the cross sections were above the river mouths to avoid in so far as possible any tidal influence from the Lake. The Hamilton was measured 1.5 miles above the entrance to Mud Lake, the Goose 3.5 miles above its mouth, the Kenamu 1 mile above its mouth, and the North West River at the narrows between Little and Grand Lakes. The cross-section line was in each case marked and described so that it might be recovered at a later date.

An additional survey was made of the main spring freshet channel of the Goose River, for during the spring a part of the volume of this river diverts from the main channel running into Goose Bay and empties directly into Terrington Basin. Data for a cross-sectional profile was obtained from measurements made with surveyor's chain, level and Philadelphia rod.

On July 10th an investigation of the hydrographic conditions in Grand Lake was made in Harvey Montague's thirty-foot motorboat Mayflower. Grand Lake is a deep freshwater lake thirty-five miles long fed by four rivers. Three oceanographic stations were occupied; one at each end and one in the middle. A BT longitudinal section was made from the narrows to the head of the Lake totaling ten posits. The greatest depth obtained was

138 fathoms.

On the vessel's return from northern Labrador the oceanographic stations established or reoccupied in early summer were duplicated. During the period August 20th to 25th the Lake Melville grid was reoccupied and Hamilton Inlet from August 26th to 28th. Likewise the river and Grand Lake surveys were repeated August 19th to 22nd.

B. Coastal and Fjord Study

A series of bathythermograph observations five to ten miles apart was made from the western portion of the Strait of Belle Isle to Saglek Bay in northern Labrador to study general hydrographic conditions not encountered in fjord studies. Whenever possible, posits made during the northward passage were duplicated on the trip south allowing direct comparison of thermal conditions between early and late summer. A total of 176 observations were made.

In northern Labrador oceanographic work was centered around Nain and Hebron. At Hebron on July 19th, 23rd, and 31, six of the oceanographic stations established by the Blue Dolphin in 1949 were reoccupied for the first time, and one new station was established further off shore. This made it possible to observe any short-term changes in the hydrographic conditions in this topotypical fjord. Hebron Fjord is of special interest because the temperature of the bottom water as observed in both 1949 and 1952 was approximately - 1.8°C. A better understanding of this unusually cold bottom water and its source would be greatly aided by observations at other seasons.

At Nain from August 11th to 14th a longitudinal section of nine oceanographic stations established by the Blue Dolphin in 1951 was reoccupied with the addition of one new station. These stations had been placed in strategic geographic locations from the head of Nain Bay through the maze of islands via Strathcona Run to the open sea, a distance of about forty-two miles. Nain Bay is in itself a more or less typical fjord seventeen miles in length.

In both 1951 and 1952 the observed water temperature below fifty meters in Strathcona Run was approximately 3.0 C., while the temperature at corresponding depths both in Nain Bay and at the outermost station of the section was less than minus 1.0 C. The transitions among these three distinct bodies of water were traced by several bathythermograph sections totaling twenty-six posits. For a more thorough understanding of this warming, and its biological implications, observations at other seasons are most desirable.

Single stations were established at Kai-Kai Inlet in the Cape Mugford area and Salt Water Pond off Anaktalik Bay south of Nain. Kai-Kai Inlet, with a maximum depth of eighty-seven fathoms, is separated from adjacent waters by a six fathom sill. Varying degrees of stagnation were observed below fifty meters. In Salt Water Pond which is connected to Anaktalik Bay only at high tide, complete stagnation and production of hydrogen sulphide was observed at forty meters, the first such instance recorded by the Blue Dolphin in Labrador coastal observations.

* * * * * * *

The Blue Dolphin in 1952 occupied 123 oceanographic stations (including reoccupations), 55 STD stations (including reoccupations), made 606 bathythermograph observations, and collected 32 bottom samples.

ANNEX C.

BIOLOGICAL FIELD REPORT

by

Mr. William Z. Lidicker

Biological investigations were carried out in so far as possible in conjunction with the major work of physical oceanography and sounding. Primary emphasis was placed on the collection of marine and fresh-water fishes. Secondary was the collection of marine invertebrates, including plankton. Especially intensive work was done in areas little worked or not visited by the Blue Dolphin in previous years.

Forty-three collections of fish were made on the Labrador coast from just south of Hamilton Inlet to Hebron. These represent thirty-two marine and eleven fresh-water collections. Two additional collections were made at Port Saunders, Newfoundland. Methods of collection included gill nets, jig, fly rod, twenty-one inch bottom dredge, and various sizes of seines, but the most useful and widely used collecting gear was the beam and otter trawls.

The eleven fresh-water collections were made at points distributed along the coast, within the range of operation. Included were collections from the lower reaches of the Hamilton, Kenamu, Naskaupi, and Goose Rivers. An effort was made to investigate landlocked lakes, especially in the north.

The success with the gill net reaffirms the observations of its extreme value made in preceding years. These nets, which were set overnight whenever feasible, supplied valuable specimens as well as some welcome additions to shipboard fare.

Data and material were gathered for continuing the life history study of the Arctic Char (Salvelinus alpinus) begun in 1951. Heads and measurements were obtained. Also stomach content and condition of gonads were noted. Most of this information came from the Hebron and Nutak areas which were not visited in 1951. An effort was also made to procure individuals of this species living their whole lives in fresh water. Because of the possibility of the increasing commercial importance of the Arctic Char, studies of this species are especially worthwhile, and may lead to a firm foundation on which to base intelligent management of this valuable resource.

A tentative total of forty species of marine and fresh-water fish, representing eighteen families, was caught on the Labrador this summer. Again new range extensions were obtained, and at least one fish new to Labrador waters was taken.

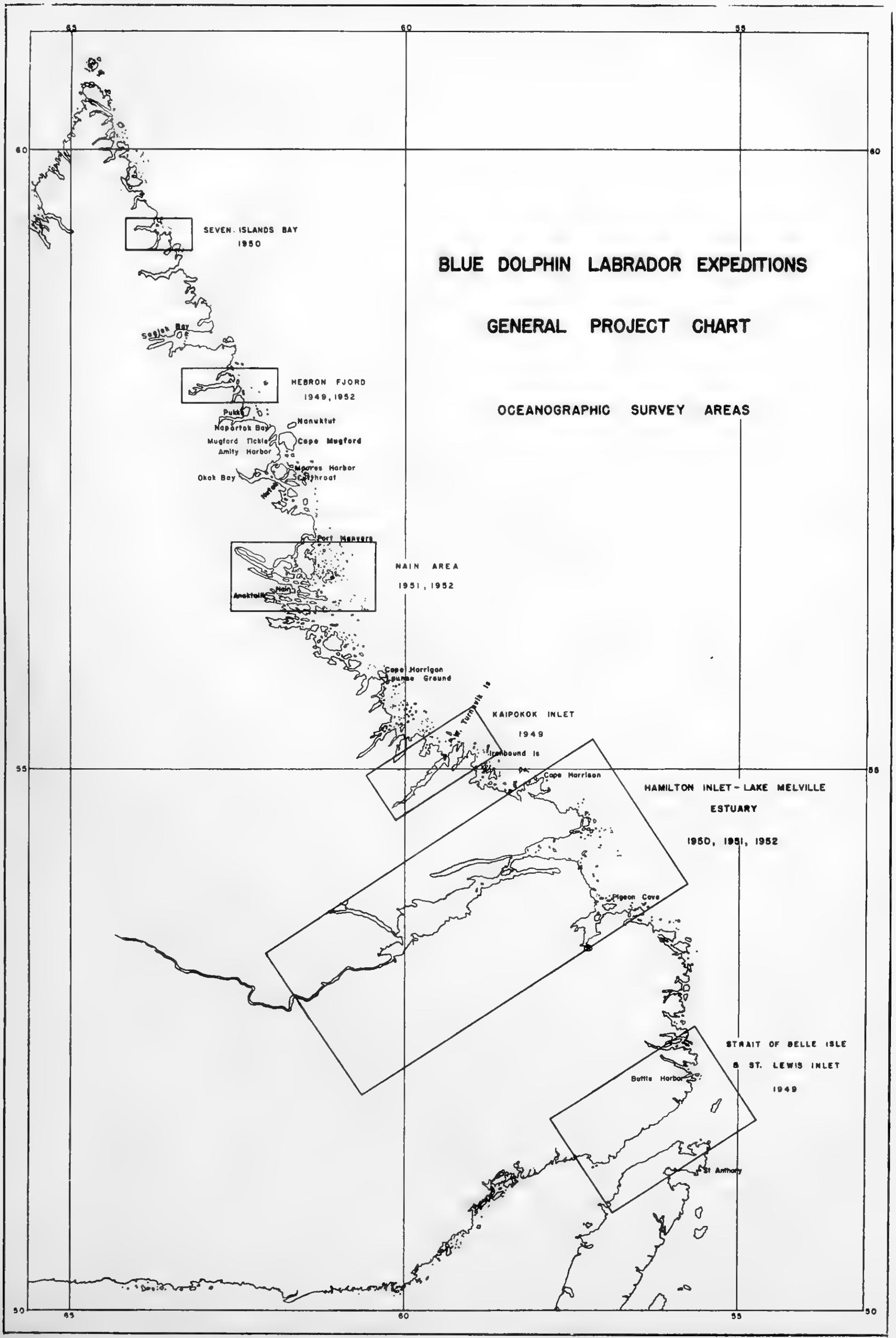
Seventeen marine invertebrate collections were made.

Thirty-eight plankton samples were obtained with the Clarke-Bumpus sampler and with a one-meter Stramin net. These samples were principally taken at oceanographic stations so that oceanographic data are available with most of the samples. Geographically, samples were taken from the Hamilton Inlet-Lake Melville Region to Saglek Bay. An effort was made to sample both the deep, cold water of Labrabor Current origin and the surface water. Several samples were taken at night so that diurnal and nocturnal fluctuations in planktonic layers might be indicated. For comparative purposes, some of the same places were sampled in early summer and again at the end of the summer.

In addition to the hydrobiological work, several individuals of one amphibian species were collected and a small collection of insects was made.

Investigations in the fields of mammalogy and ornithology were almost entirely restricted to field observations, because no men were available this year for full time work in these fields. Complete notes were kept by the author, however, on his limited obersvations of birds and mammals.

Invertebrate and plankton collections were sent directly to the U. S. National Museum, whereas the fish have been sent temporarily to the Woods Hole Oceanographic Institution to be studied by Mr. Richard H. Backus, prior to ultimate disposition in the U. S. National Museum. Amphibians and insects have been sent to Cornell University.



BLUE DOLPHIN LABRADOR EXPEDITIONS

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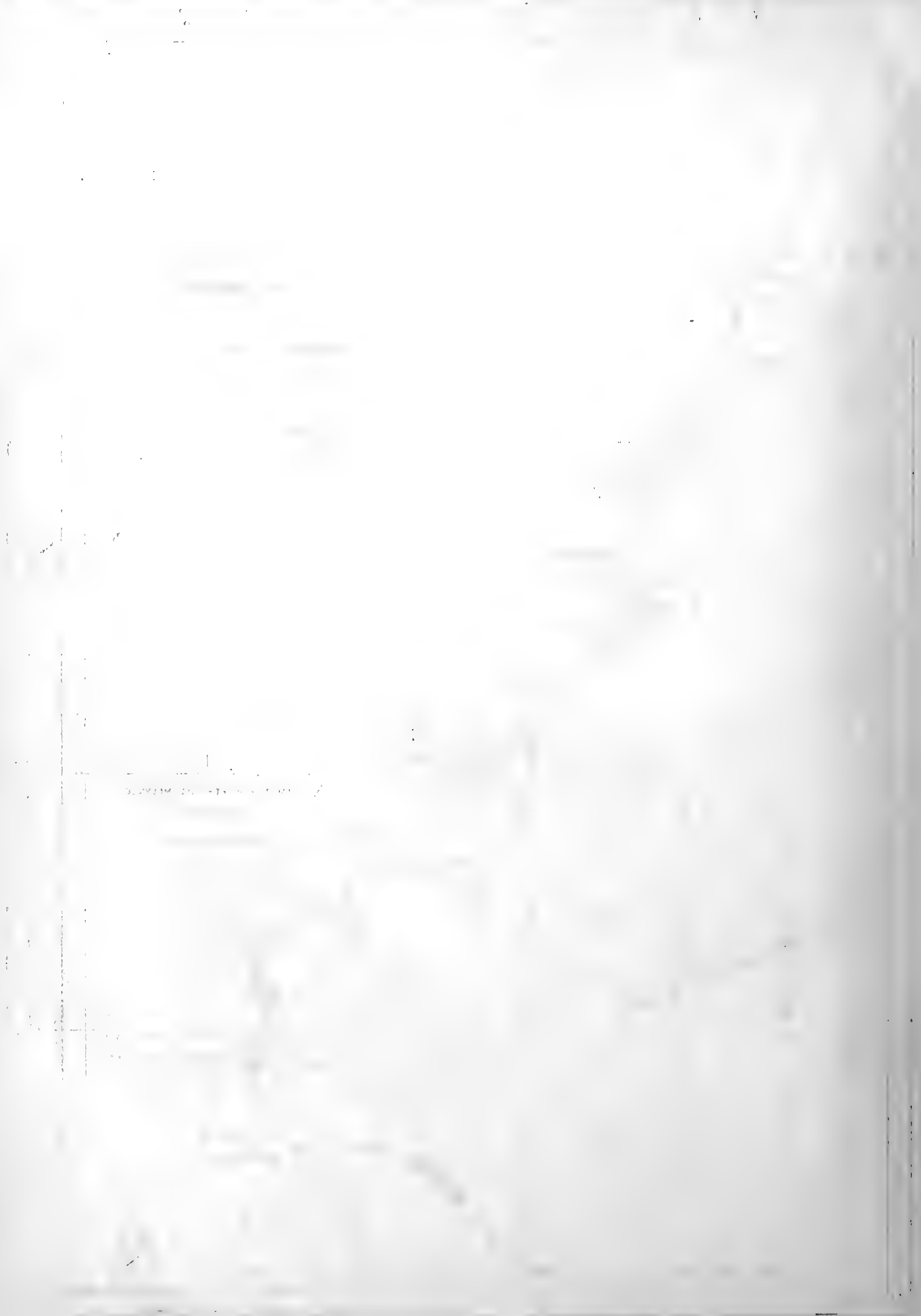
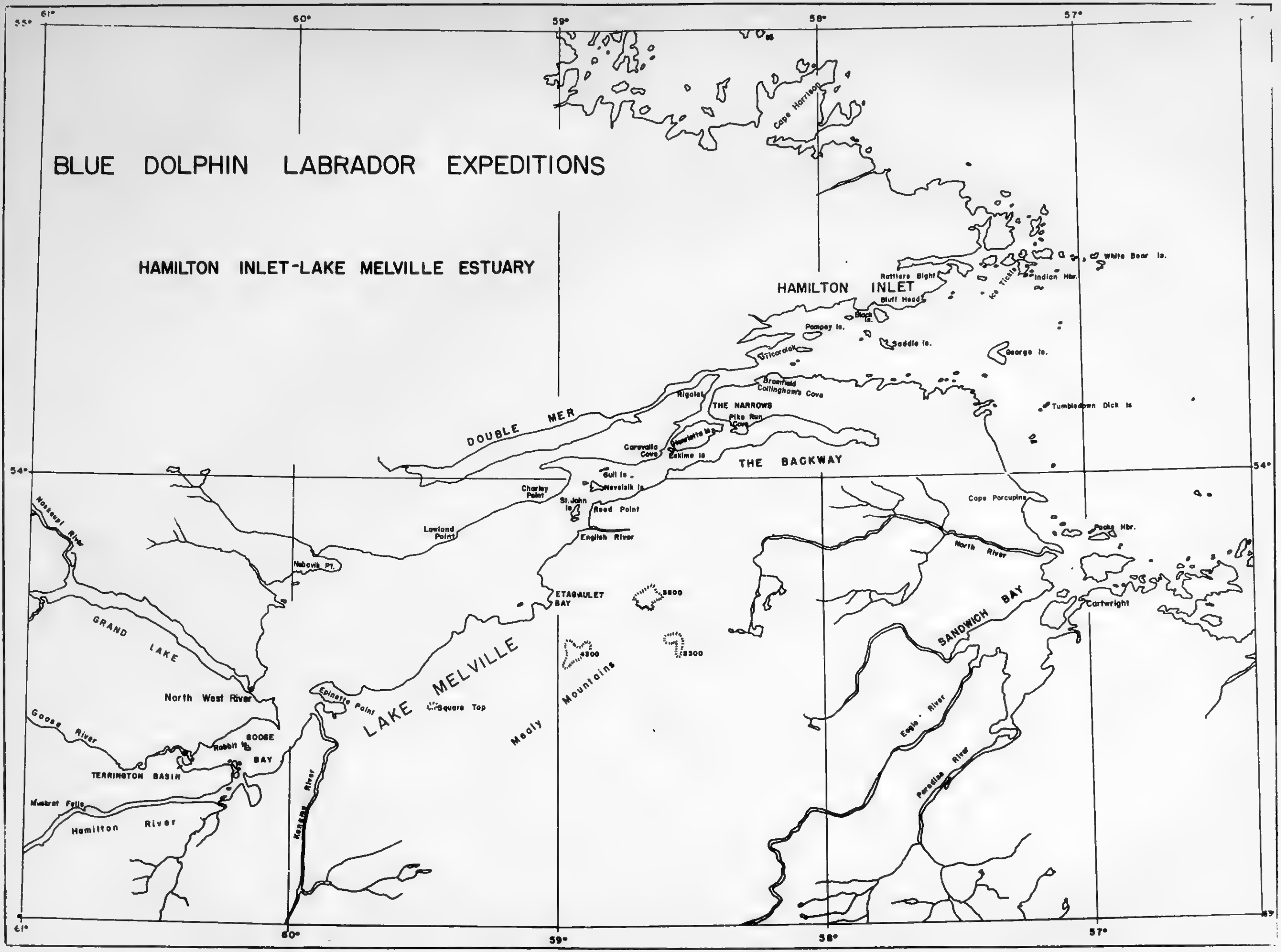


BLUE DOLPHIN LABRADOR EXPEDITIONS

HAMILTON INLET-LAKE MELVILLE ESTUARY



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